Attorney Ref. No: 1074-045-PWH

IN THE US PATENT AND TRADEMARK OFFICE
BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of: Kadlec, P.

Group Art Unit: 2851

Application No: 09/936,967

Filed: Feb 25, 2002

For: *Integrated Diagnostic System for Photoelastic Modulator*

Examiner: Cruz, M.

APPELLANT'S BRIEF

(37 CFR § 1.192)

COMMISSIONER FOR PATENTS:

Sir:

This brief is in furtherance of the Notice of Appeal filed June 1, 2004, in connection with the captioned application. The $330 fee required under 37 CFR 1.17(c) is enclosed herewith.

This brief is transmitted in triplicate.

08/27/2004 MHEKONEN 00000016 09936967

02 FC:1402 330.00 OP

CERTIFICATE OF TRANSMISSION/MAILING

I HEREBY CERTIFY THAT THIS CORRESPONDENCE AND THE DOCUMENTS REFERRED TO AS BEING ATTACHED OR ENCLOSED HEREWITH ARE BEING FACSIMILE TRANSMITTED TO THE USPTO OR DEPOSITED WITH THE UNITED STATES POSTAL SERVICE WITH SUFFICIENT POSTAGE AS FIRST CLASS MAIL IN AN ENVELOPE ADDRESSED TO: COMMISSIONER FOR PATENTS, P.O. BOX 1450, ALEXANDRIA, VA 22313-1450

ON August 23, 2004

Patrick W. Hughey

CONTENTS

1. Real Party in Interest

The real party in interest is Hinds Instruments, Inc.

2. Related Appeals and Interferences

No related appeals or interferences.

3. Status of Claims

Claims 1, 3 – 7, 9 – 25 are pending in the application. Claims 2 and 8 have been canceled. Claims 7 – 18 and 20 – 25 have been allowed. Claims 1, 3 – 6 and 19 have been rejected and are the claims on appeal.

4. Status of Amendments

No claim amendments were filed with the response subsequent to final rejection.

5. Summary of the Invention

The invention defined in the claims in the appeal generally relates to a diagnostic system for a photoelastic modulator (PEM). The diagnostic system is integrated with the PEM.

In one embodiment,[1] the PEM[2] includes a transparent optical element,[3] such as fused silica, that has attached to it piezoelectric transducers.[4] The transducers vibrate the optical element at a fixed frequency, within, for example, the low-frequency, ultrasound range of about 20 kHz to 100 kHz. The optical element is compressed and extended as a result of the vibration.

The compression and extension of the optical element imparts oscillating birefringence characteristics to the optical element, which in turn introduces retardance characteristics into a primary light beam 28 that is directed through the optical element. Retardance can be considered as the time-varying phase difference between the

---

[1] For this paper, appellant refers to the drawings and text portions of the published international application WO 00/58699 upon which the present national phase application is based.

[2] Figure 1, reference numeral 20.

[3] Figure 1, reference numeral 32.

[4] Figure 1, reference numeral 34.

perpendicular components of the polarized light that propagates through the optical element of the PEM.[5] The light beam that passes through the optical element is then directed through a transparent sample.[6] The sample's affect on the beam 28 is detected, and this information is used to determine optical characteristics of the sample.

An understanding of precisely how much retardance is imparted into a light beam 28 by the PEM is important for ensuring accuracy when that beam is thus used for characterizing a sample. As explained on page 2 of the application, the vibration or operating frequency of the PEM can drift with changes in ambient temperature and other factors. Accordingly, the retardance imparted by the optical element of the PEM can also drift or vary.

The real-time information indicating the actual performance of the PEM (that is, the particulars of the retardance imparted by the PEM into the light that passes through it) is provided by the claimed diagnostic system. To this end, one preferred embodiment of the integrated photoelastic modulator and diagnostic system includes a photoelastic modulator that includes an optical element. Primary light[7] is directed through a primary aperture[8] of the optical element.

The diagnostic component of the invention includes a diagnostic light source for directing diagnostic light through the optical element.[9] As explained in the application,[10] the diagnostic light is directed through the optical element at a location that is remote from the primary aperture. Specifically, the diagnostic light is directed through a remote (from the primary aperture) diagnostic aperture.[11] Such separated primary and diagnostic

---

[5] Application page 4, line 23 – page 5, line 2.

[6] Figure 1, reference numeral 36.

[7] See for example, reference numeral 28, Fig. 1

[8] See, for example, reference numeral 38, Fig. 2, application page 4, paragraph 4.

[9] See, for example, reference numerals 50 (source) and 52 (diagnostic beam) of Fig. 1 and application page 6, paragraph 1.

[10] Page 6, second paragraph.

[11] See reference numeral 58, Fig. 2.

beams permit simultaneous operation of the primary PEM operation and the diagnostic system without one interfering with the other.[12]

In one embodiment, the diagnostic light source[13] provides diagnostic light that has a wavelength other than the wavelength of the primary light.

6. Issues

a. Whether Claims 1, 3 – 6, and 19 Were Properly Rejected Under 35 USC §102(e) as Being Anticipated by Wang et al, US Patent No. 6,473,179.

7. Grouping of Claims

a. Claims 1, 3 – 6, and 19 stand rejected under 35 USC § 102(e) as anticipated by Wang et al, US Patent No .6,473,179. Claims 1, 6, and 19 do not stand or fall together.

8. Argument

a. The Rejection of Claims 1, 3 – 6, and 19 Under 35 USC §102(e) Should be Reversed.

Claim 1

This claim was rejected as anticipated by US Patent No. 6,473,179 to Wang et al.

Claim 1 points out that the photoelastic modulator ("PEM") includes an optical element that has a primary aperture. Primary light is directed through the primary aperture of the optical element.

The diagnostic system includes a light source that directs diagnostic light through the optical element of the PEM. The diagnostic light is distinct from the primary light, and the diagnostic light is directed through the optical element at a location remote from the primary aperture of the optical element.

In the final office action, dated March 1, 2004, the grounds for rejecting claim 1 assert that the Wang patent includes primary light directed through an optical element of a PEM. The grounds also assert that diagnostic light that is distinct from the primary light is directed through the optical element.

---

[12] Application page 3, first paragraph.

[13] Fig. 1, reference numeral 50

Appellant notes that claim 1 specifies that the primary light and diagnostic light pass through the same optical element. In this regard, claim 1 specifies in part "*a diagnostic light source for directing through the optical element diagnostic light that is distinct from the primary light... .*" The broadest reasonable interpretation of the phrase "*the optical element*" in the foregoing quote is that the optical element identified there is the same optical element through which the primary light passes. The use of the definite article "the" before optical element requires this interpretation. Antecedent basis for this is provided in line 2 of claim 1: "*a photoelastic modulator including an optical element.*"

The final-rejection grounds point out in the Wang patent an optical element (25) through which primary light passes. That element 25 appears in Fig. 5 as part of the PEM 24 that is illustrated in Fig. 1 of Wang. The final-rejection grounds do not, however, show where in Wang a distinct source of diagnostic light is directed through that optical element (25) as specified in Claim 1.

In the brief comments accompanying the May 21, 2004 advisory action, the examiner reasserts the rejection of claim 1 and states:

> "*The applicant has argued that the prior art does not teach 'a diagnostic light source for directing through the optical element diagnostic light that is distinct from the primary light' However, Wang ... discloses a diagnostic system (50) including a diagnostic light source (76) for directing through the optical element diagnostic light (74) that is distinct from the primary light, wherein the diagnostic light source (76) is configured so that the diagnostic light (Bi) is directed through the optical element (76) at a location remote from the primary aperture (see Figure 4).* " (Emphasis added).

Appellant notes that the thing 76 in Wang, Fig. 4, that the Examiner characterizes as the optical element of the photoelastic modulator is, in fact, a photodiode-type detector.[14] That detector is not part of a photoelastic modulator (the photoelastic modulator appears at 24 in the optical setup of Fig. 1 in Wang), nor can it be fairly characterized as such.

---

[14] Note column 5, lines 17 – 24 of Wang.

Appellant also notes that the advisory action also mischaracterizes the photodiode-type light detector 76 in Wang as a "diagnostic light source."

In view of the foregoing, Appellant submits that a proper rejection under 35 USC §102 has not been made because the rejection grounds fail to state were in Wang the specifics of claim 1 are found. This argument in favor of reversal of the rejection is consistent with the holdings of the Court of Appeals for the Federal Circuit, such as noted in the MPEP § 2131, repeated here:

> *"'A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.' Verdegaal Bros. v. Union Oil Co. of California, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987)."*

Since each and every element set forth in claim 1 is not found in Wang, Appellant requests the rejection of claim 1 and the claims depending therefrom be reversed.

Claim 6

This claim points out in the final clause that the diagnostic system of claim 1 also includes processing means for determining a retardance characteristic of the diagnostic light. Further, that characteristic of the diagnostic light is used to calculate a retardance characteristic in the primary light.

In rejecting this claim, the final office action[15] repeats, verbatim, the "processing means" clause of claim 6 and indicates that this means is disclosed in Wang, column 5, lines 17 – 23. Appellant notes, however, that column 5, lines 17 – 23 of Wang describes certain detector components, and is repeated here:

> "*A sub-housing 70 is fastened inside of the detector components housing 60 against the flat side 62* [of the housing]. *The sub-housing 70 is a generally cylindrical member having an aperture 72 formed in the bottom. Just above the aperture 72 resides a compact, Glan-Taylor type analyzer 74 that is arranged so that its polarization direction is 0°, parallel with that of the PEM 24.*"

[15] Page 3, last four lines of the final office action.

Appellant submits that nothing in the foregoing anticipates the processing means as recited in claim 6 and, therefore, the rejection of this claim should also be reversed.

Claim 19

This claim specifies that the diagnostic light source has a wavelength other than the wavelength of the primary light.

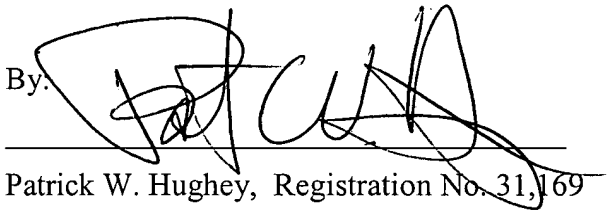
The rejection grounds in the final office action, as well as the comments in the advisory action, fail to identify where in Wang this limitation is found. Accordingly, the anticipation rejection of claim 19 should be reversed.

9. Summary

In view of the foregoing, appellant submits that the rejections of claims 1, 3 – 6 and 19 were improper, and reversal of all of the rejections is respectfully requested.

Respectfully submitted,

ipsolon llp

By: 

Patrick W. Hughey, Registration No. 31,169

805 SW Broadway #2740
Portland OR 97205
Tel: 503.419.0704

10. Appendix A: The Claims Involved in the Appeal

1. An integrated photoelastic modulator and diagnostic system comprising:

a photoelastic modulator including an optical element having a primary aperture through which primary light is directed; and

a diagnostic system including a diagnostic light source for directing through the optical element diagnostic light that is distinct from the primary light, wherein the diagnostic light source is configured so that the diagnostic light is directed through the optical element at a location remote from the primary aperture.

3. The system of claim 1 wherein the photoelastic modulator is operable to provide retardance characteristics in primary light that is directed through the optical element, and wherein the diagnostic system includes processing means for determining at least one retardance characteristic provided by the photoelastic modulator.

4. The system of claim 3 including display means for displaying the retardance characteristic determined by the processing means.

5. The system of claim 3 including feedback means for converting signals representing the determined retardance characteristic into control signals for the photoelastic modulator.

6. The system of claim 1 wherein the photoelastic modulator is operable to provide retardance characteristics in primary light that is directed through the optical element, and wherein the diagnostic system includes processing means for determining a retardance characteristic of the diagnostic light and using the retardance characteristic of

the diagnostic light to calculate a retardance characteristic in the primary light that is provided by the photoelastic modulator.

7. A method of operating a photoelastic modulator that is operable for vibrating an optical element to impart retardance characteristics in a primary light beam that is directed through the optical element, comprising the steps of:

directing a diagnostic beam of light through the optical element;

determining a retardance characteristic of the diagnostic beam of light that passes through the optical element;

generating a diagnostic signal representative of that retardance characteristic; and

converting the diagnostic signal to a verification signal that is representative of a retardance characteristic of the primary light beam.

9. The method of claim 7 including the step of converting the diagnostic signal into a control signal for controlling the photoelastic modulator.

10. The method of claim 7 including the step of transmitting the primary light beam and the diagnostic beam of light through the optical element so that the beams do not cross each other.

11. The method of claim 10 wherein the directing step includes the step of directing the diagnostic beam of light through a portion of the optical element that is spaced an offset distance from another portion of the optical element, through which other portion the primary light beam is directed such that the retardance characteristic of the diagnostic beam of light is different from the imparted retardance characteristic in a primary light beam.

12. The method of claim 11 including the step of considering the offset distance and the diagnostic signal for determining a verification signal that is representative of a retardance characteristic of the primary light beam.

13. The method of claim 10 including the step of housing the optical element in a manner that defines two discrete apertures through which the primary and diagnostic light beams may be directed so that the primary beam is transmitted through one aperture and the diagnostic beam is transmitted through the other aperture.

14. A diagnostic system for a photoelastic modulator that is operable for vibrating an optical element to impart retardance characteristics in primary light that is transmitted through the optical element at a first location in the optical element, comprising:

a source of diagnostic light arranged to transmit diagnostic light through the optical element at a second location that is spaced from the first location so that the optical element imparts retardance characteristics that are different from the retardance characteristics imparted in the primary light beam; and

a detector arranged for detecting at least a portion of the diagnostic light transmitted through the second location of optical element.

15. The system of claim 14 including mounting means for mounting the diagnostic system in a manner that permits simultaneous transmission of the diagnostic light and the primary light through the optical element in a manner such that the diagnostic and primary light travel along substantially parallel paths in the optical element.

16. The system of claim 14 further comprising a housing for opaquely enclosing the optical element but for two discrete, transparent openings.

17. The system of claim 14 wherein the light source includes a collimating lens and polarizer.

18. The system of claim 14 wherein the detector includes a waveplate and an analyzer.

19. The system of claim 1 wherein the diagnostic light source provides diagnostic light that has a wavelength other than the wavelength of the primary light.

20. The method of claim 7 wherein the directing step includes the step of selecting a wavelength of the diagnostic beam to be different from the wavelength of the primary beam.

21. An integrated photoelastic modulator and diagnostic system comprising:

a photoelastic modulator including an optical element having a primary aperture through which primary light beam is directed;

a diagnostic system including a diagnostic light source for directing through the optical element a diagnostic light beam that is distinct from the primary light beam;

a detector for detecting diagnostic light that is directed through the optical element; and

processing means for extrapolating from the detected diagnostic light a retardance characteristic imparted by the photoelastic modulator to the primary light.

22. The system of claim 21 including means for directing the primary and diagnostic light beams through the optical element so that the center of the beams are spaced apart a distance "D" from each other.

23. The system of claim 22 wherein the processing means uses the distance "D" in extrapolating the retardance characteristic imparted by the photoelastic modulator to the primary light.

24. The system of claim 21 wherein the diagnostic system includes means for directing the diagnostic light and the primary light through the optical element at different times.

25. The system of claim 21 further comprising feedback means for converting signals representing the extrapolated retardance characteristic into a control signal for the photoelastic modulator.